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I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

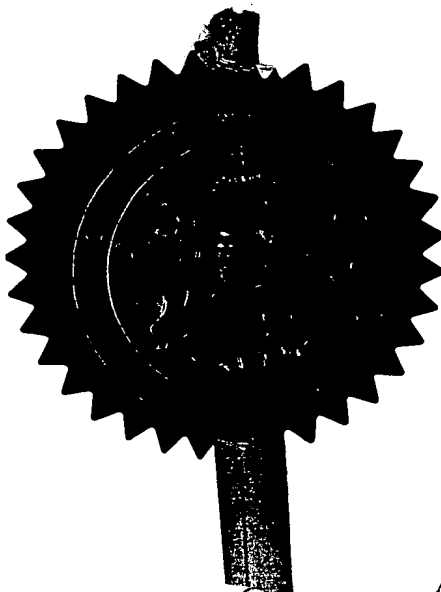
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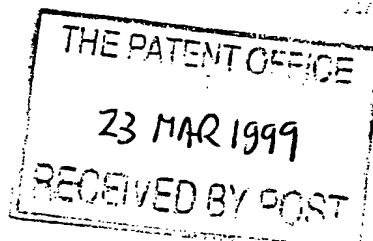
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Dated 16 AUG 2000



Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)



The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

HEPI 10891

2. Patent application number

(The Patent Office will fill in this part)

23 MAR 1999

9906536.9

3. Full name, address and postcode of the or of each applicant (underline all surnames)

HAWKER ENERGY PRODUCTS LIMITED
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CARLISLE PLACE
LONDON
SW1P 1BX

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

7396930001

4. Title of the invention

BATTERY CASING

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

BARRY WILLIAM TREVES

BTR Group Intellectual Property
Knights House, 2 The Parade
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Patents ADP number (if you know it)

7044271001
J R BADGER
INVENSYS PLC
KNIGHTS HOUSE
2 THE PARADE
SUTTON COLDFIELD
WEST MIDLANDS B72 1PH

1360551002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.
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Continuation sheets of this form

Description	4
Claim(s)	-
Abstract	-
Drawing(s)	7

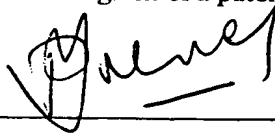


10. If you are also filing any of the following, state how many against each item.

Priority documents	-
Translations of priority documents	-
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	-
Request for preliminary examination and search (Patents Form 9/77)	-
Request for substantive examination (Patents Form 10/77)	-
Any other documents (please specify)	-

11. I/We request the grant of a patent on the basis of this application.

Signature



Date 22/3/99

12. Name and daytime telephone number of person to contact in the United Kingdom

E A Fenwick or B W Treves 0121 362 4864

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BATTERY CASING

This invention relates to a battery casing, and in particular to a valve regulated lead acid battery casing.

During the operation of a lead acid battery, gases including hydrogen are expelled from the cell or cells. There is thus the danger of an explosive mixture of expelled hydrogen and oxygen in the air being formed near the battery. Further, the expelled gases may carry acid vapour or even droplets and there is the possibility of corrosion of metals outside the battery occurring.

It is an object of the present invention to provide a battery casing which prevents or reduces the effects of the above disadvantages.

In accordance with the invention a battery casing comprises a lid having a recess at the base of which is a valve through which gas is expelled from the battery, a cover for sealingly covering the recess, a gas collection space being defined within the covered recess, and guide means for guiding gas from the collection space away from the battery.

Preferably a plurality of valves, e g one for each cell, is provided at the base of the recess.

Preferably the cover may cover the recess in more than one way. Preferably also the top surface of the cover lies no higher than the adjacent surface of the battery.

The guide means may be located in more than one way and may comprise a nozzle protruding from the cover and to which a flexible tube may be attached.

One embodiment of the invention will now be described by way of example only, with reference to the accompanying drawings of which:

Figure 1 is a perspective view of a battery having a casing according to the invention;

Figure 2 is a plan view of the battery shown in Figure 1 on an enlarged scale;

Figure 3 is a cross-section on line III-III of Figure 2;

Figure 4 is a cross-section on line IV-IV of Figure 2;

Figure 5 is a cross-section on line V-V of Figure 2;

Figure 6 is a plan view of the battery shown in Figure 1 with the cover removed;

Figure 7 is a cross-section on line VII-VII of Figure 2; and

Figure 8 is an enlarged view of detail VIII of Figure 7.

As shown the battery having a casing 1 according to the invention comprises a rectangular box 2 having a lid 3 and two handles 4, 5 one at each end. The casing is made of moulded plastic material e g ABS. Positive 6 and negative 7 terminals are provided adjacent one end. As shown particularly in Figure 1, the terminals 6 and 7 are protected by box-like shields 9 and 10 respectively. The battery illustrated has six cells, so the casing is divided by internal walls 11, see Figures 3 and 4 particularly.

Formed in the lid 3 by moulding is an elongated recess 12 having two straight parallel sides 13, 14 and semi-circular end parts 15, 16. At the base of the recess are six vents 17, one for each cell, and two flame arrester supports 26, 27. The supports are located one adjacent each end part of the recess and each comprises an upstanding circular flange 28 with four regularly spaced-apart openings 29 (see Figures 6 and 8).

The periphery of the recess is defined by a vertical wall 18. Inwardly of the wall is an upstanding flange 19 having a height less than that of the wall over most of the wall length. The straight parts of the flange 19 are provided on its inner side with a plurality of triangular buttresses 55 to provide rigidity. A groove 21 is defined between the flange and the wall and a shoulder 20 is formed within the groove 21 adjacent the flange 19. Thus the groove 21 has a deep portion adjacent the wall 18 and a shallow portion adjacent the flange 19.

At the centre of both semi-circular end parts 15, 16 of the recess 2, the wall 18 is interrupted by a semi-circular depression 22 (see Figure 8). Both depressions, one at each end of the recess as viewed in plan (see Figure 6) lead into semi-circular cross-sectional channels 23, 24 moulded into the lid. Each channel extends along the mid-line of the battery towards the two narrow ends of the lid respectively.

A cover 25 of similar material to the casing 1, is moulded to fit tightly into the recess 12 in the lid 3. Thus, like the recess 12, the cover 25 has two straight

sides 30, 31 and two semi-circular ends 32, 33. Around the periphery of the cover 25 is a cover flange 34, the outer surface 35 of which engages the wall 18 of the recess. The cover flange 34 is the same depth as the wall 18 so that the lower extremity 36 of the cover flange 34 fits into the deep part 18 of the groove 20 and the upper surface 37 of the cover 25 is level with the upper surface 38 of the lid 3. The cover flange 34 has a shoulder 39 on its inner side and over most of its length. This shoulder 39 has an inner surface 40 which lies alongside the outer surface 41 of the flange 19 in the recess 25 on the lid 3. As can be seen particularly in Figures 3 and 4, a rectangular cross-sectional channel 42 is defined between the inner surface of the cover flange, above the shoulder 20 in the groove 21 in the recess 12, outwardly of the flange in the recess and below the shoulder on the lid. An 'O' ring seal (not shown in the drawings) is located within the channel 42 to provide an air-tight seal between the cover 25 and the recess 12.

At the centre of one semi-circular end part 32 (the left-hand end as shown in Figure 2) the cover 25 is formed with a nozzle 43 for receiving the end of a flexible tube (not shown). An external enlargement 44 is provided adjacent the nozzle mouth 45 to provide a means to prevent the tube becoming detached. As can be seen in Figure 8 the nozzle has an internal tapered passage 46, the end of which terminates in a cylindrical recess 47 having a shoulder 48 adjacent the upper part thereof. A flame arrester 49 comprising a porous polyethylene or ceramic disc 49 seats within the recess 47 on the shoulder 48 so that a small gap 50 is provided between the arrester 49 and the upper part of the recess 51. The flame arrester 49 is a push fit in the recess 47 and is also held in position on the upper edges 52 of the four parts of the circular flange 28 of the arrester support.

In use, gas escapes from the cells of the battery through the valves and collects in the recess under the cover. As pressure increases the gas passes through the flame arrester, through the small gap, along the nozzle passage and then through the tube to a safe location away from the battery.

In the embodiment illustrated the cover may be positioned in the lid recess the opposite way round i.e. with the nozzle at the right-hand side as

shown in Figure 2, thus giving the user a choice of operation.

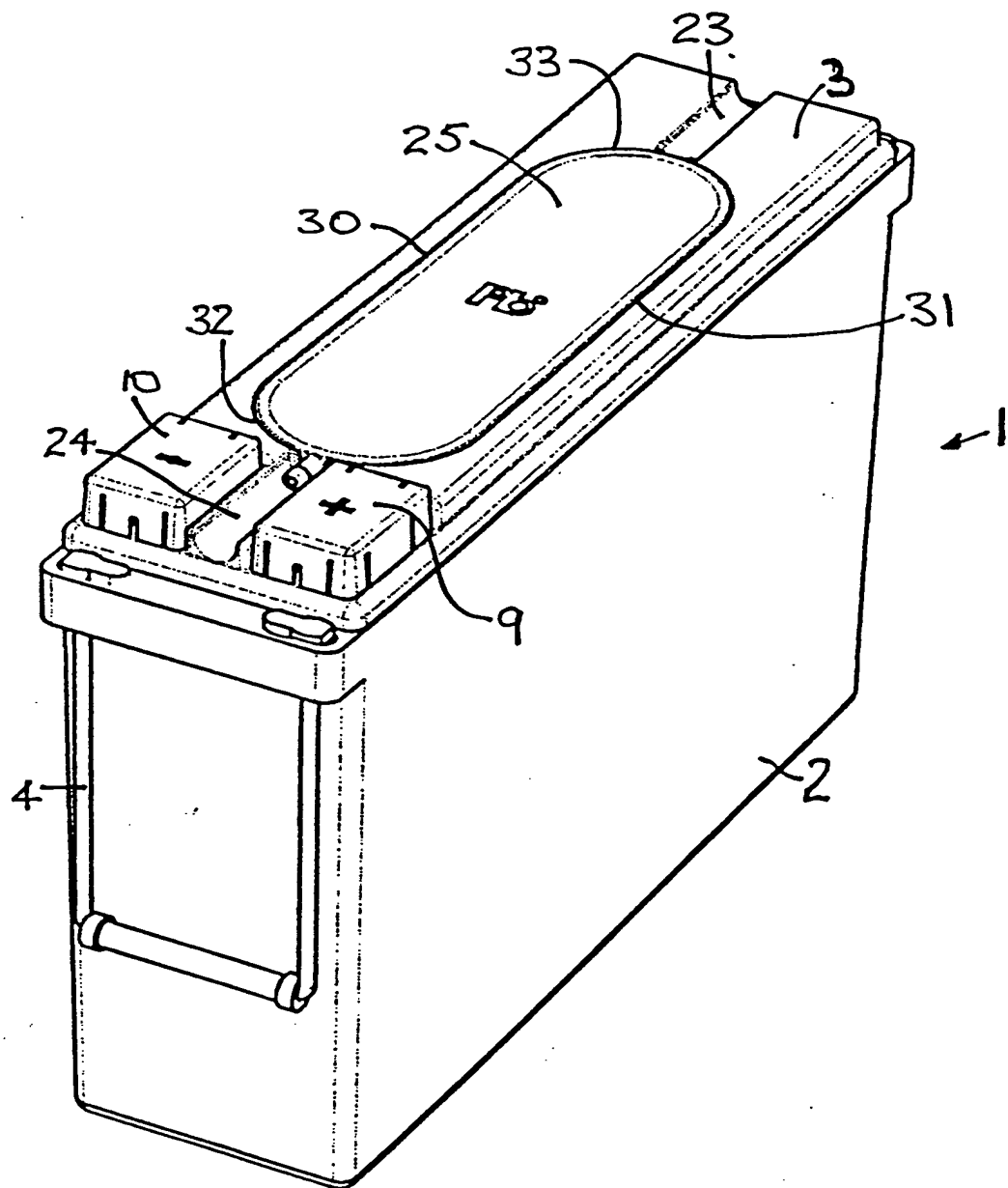


Figure 1

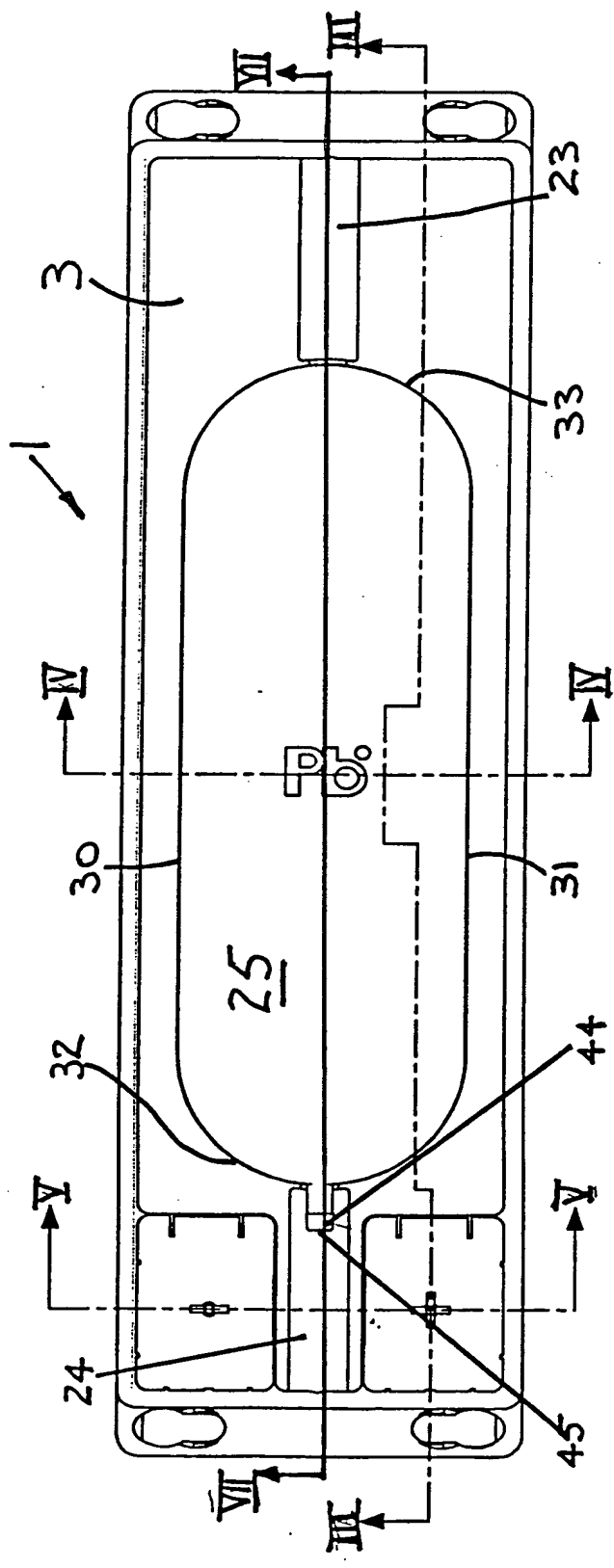


Figure 2



SECTION III-A11



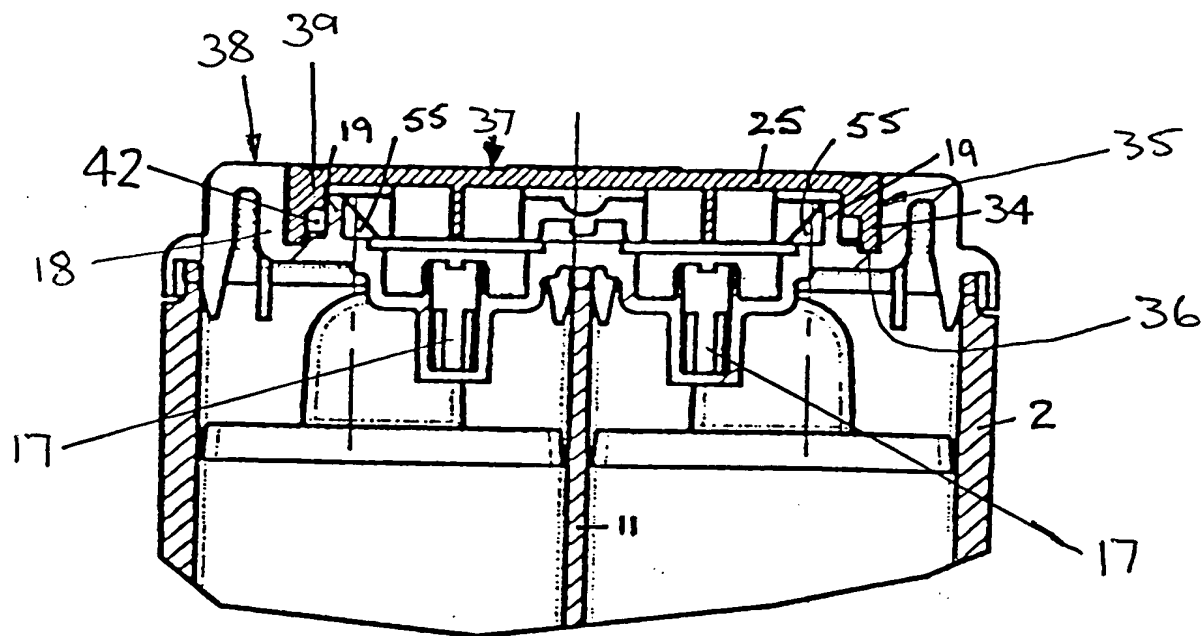


Figure 4

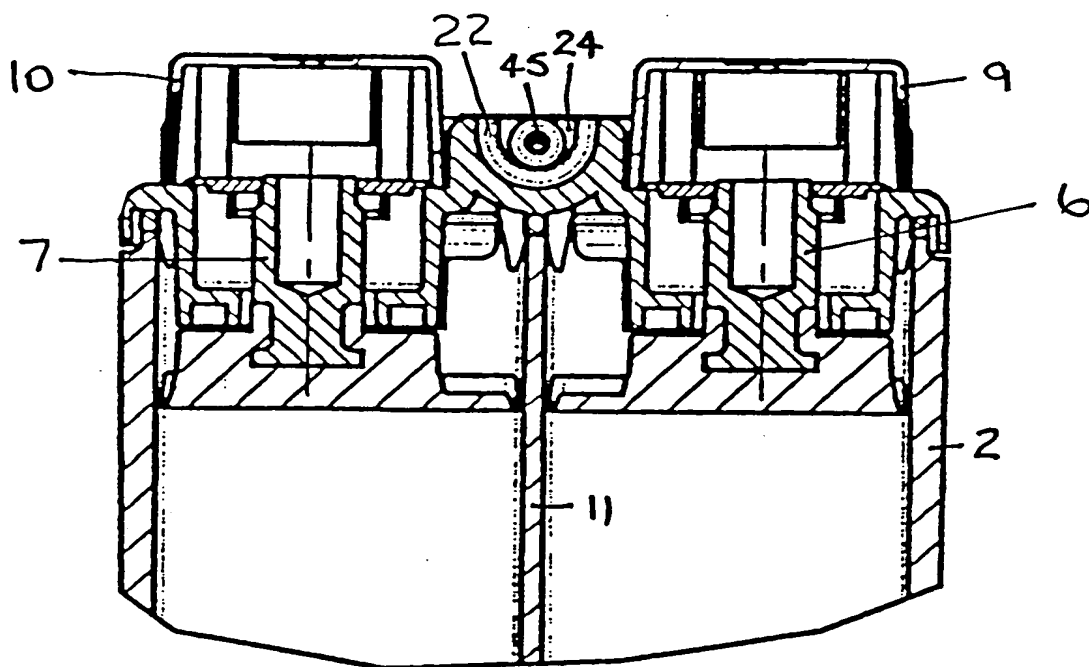


Figure 5

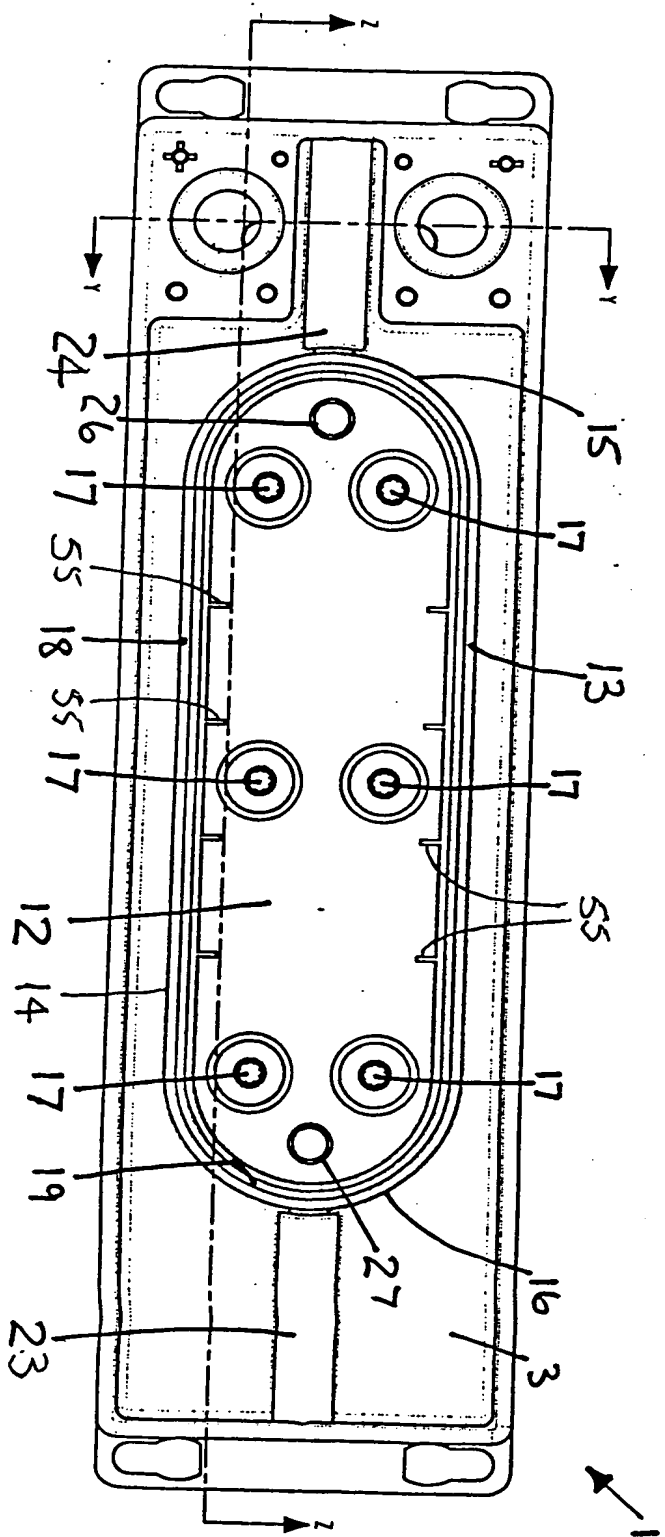


Figure 6

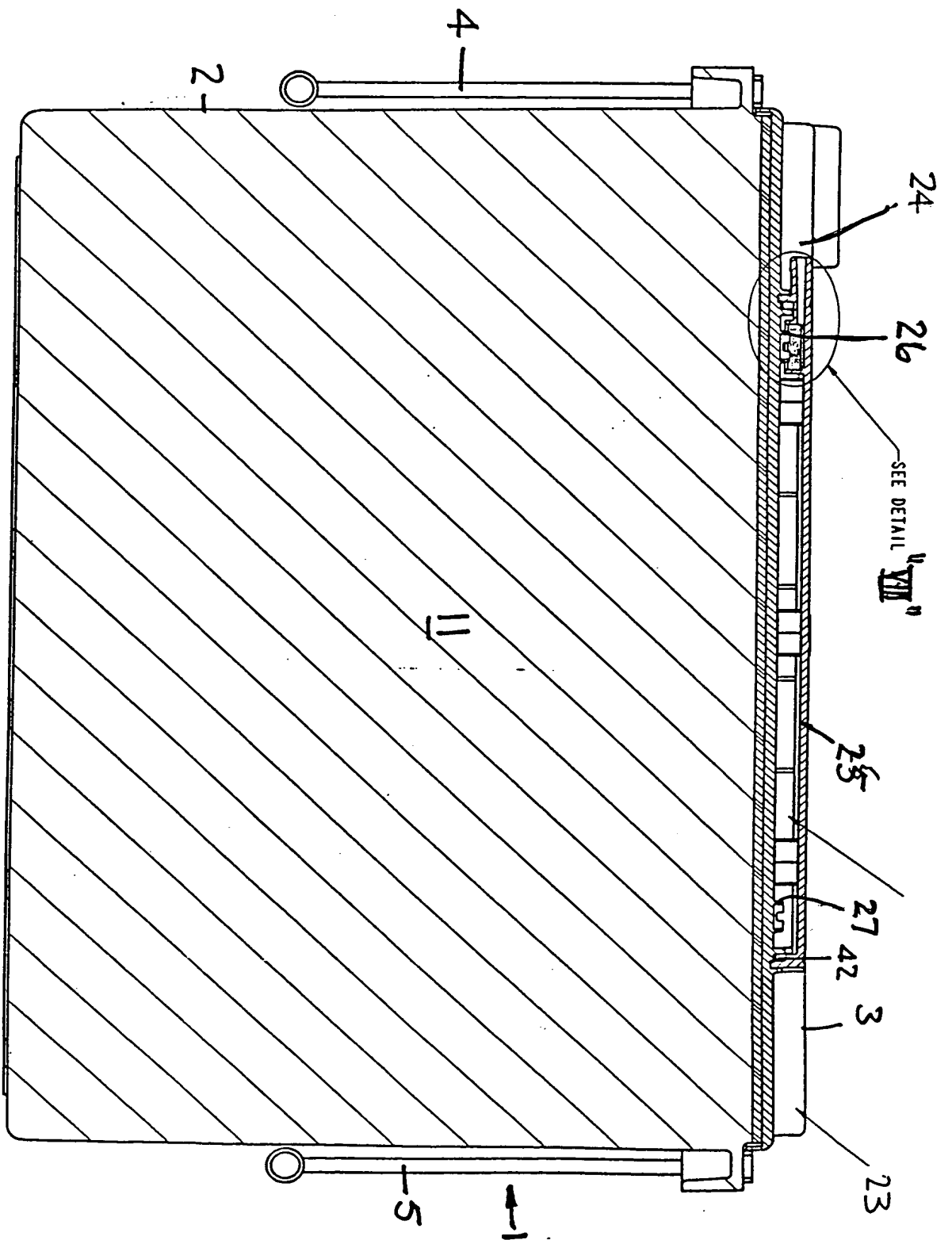


Figure 7

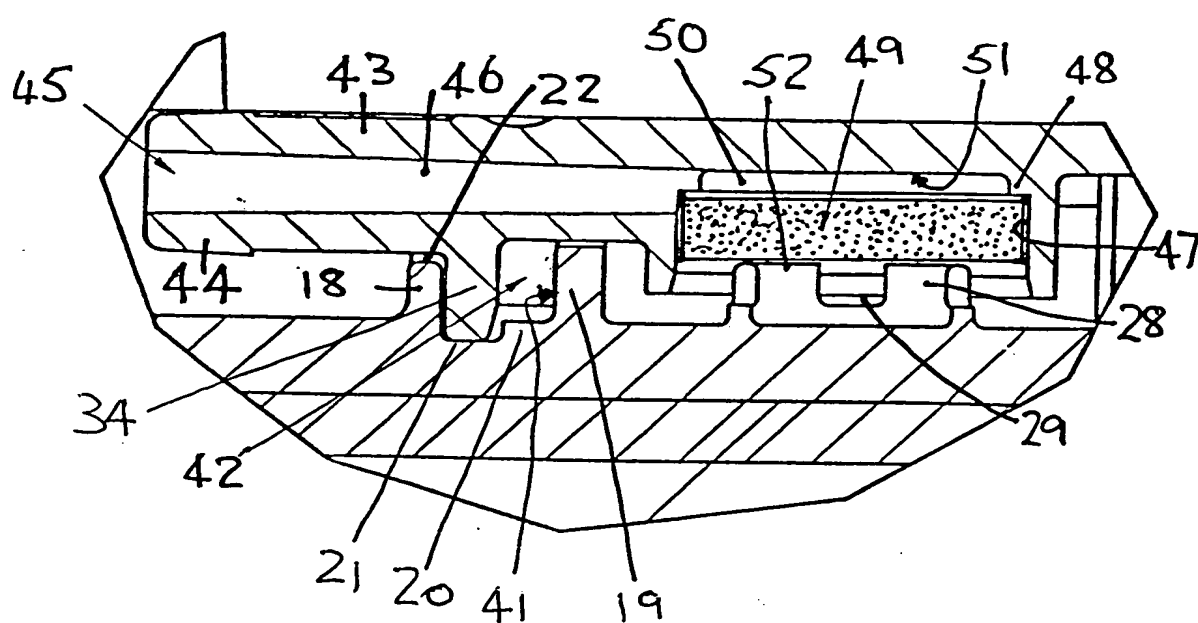


Figure 8

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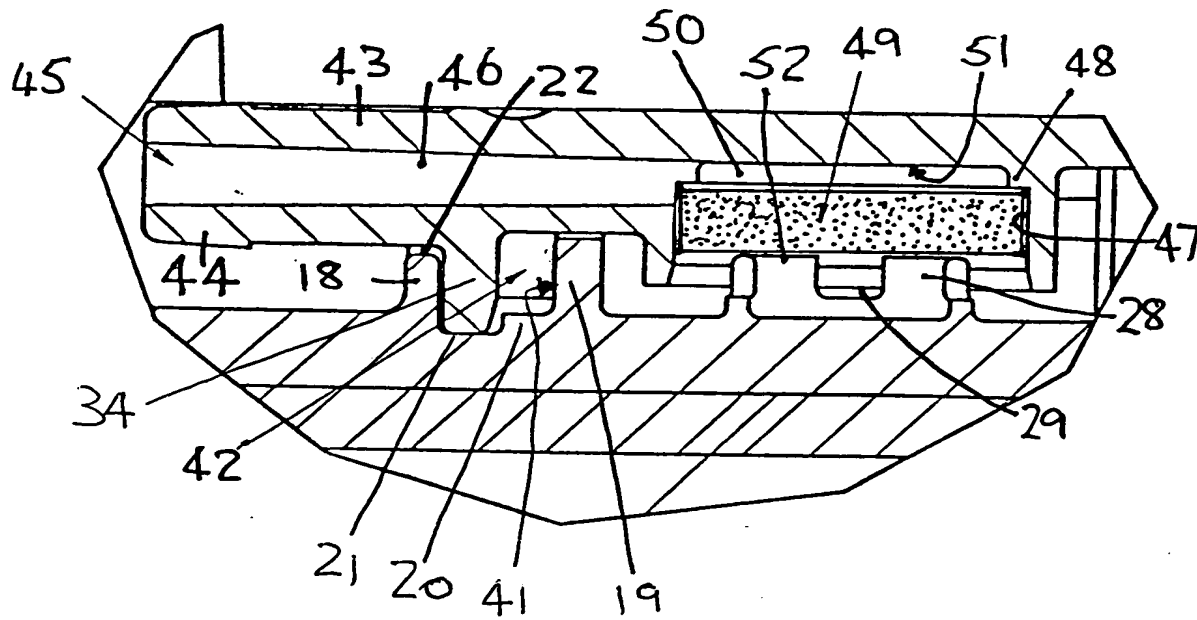


Figure 8

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